Next-Generation Ground Systems Definition and Development Support

Barry Boehm, USC
GSAW 2011 Plenary Talk
March 1, 2011
Outline

- Future Ground Systems Development Support
- Systems 2020 Context
- Systems 2020 FY11 Startup Strategy
- Aerospace-USC-AFOSR-AFIT Response
Future Ground Systems Development Support

• Wideband virtual collaboration support

• Domain model-based system definition, generation
  • Replacing most documentation

• Metadata-based model interoperability
  • Across domains, phases, timescales

• Models on steroids via multicore processors
  • Some used for parallelizing model execution
  • Some used for parallel tradeoff analysis, Monte Carlo analysis, assertion checking, multisided mission analysis

• Support of rapid, concurrent, evidence-based systems engineering and management
Systems 2020
Strategic Initiative Overview

Kristen Baldwin
ODDR&E/Systems Engineering

13th Annual NDIA Systems Engineering Conference
San Diego, CA | October 28, 2010
Designing DoD Systems for Adaptability

**Platform Based Engineering**
Using a common core platform to develop many related systems/capabilities

**Trusted System Design**
Developing trusted systems from untrusted components

**Model Based Engineering**
Using modeling and simulation for rapid, concurrent, integrated system development and manufacturing

**Capability on Demand**
Real-time Adaptive Systems
Rapidly Reconfigurable Systems
Pre-planned Disposable Systems

**Design Disciplines**

**Design Framework**

**Adaptable DoD Systems**
Overview of S-2020 Path Ahead
POM12 5-year budget over $100M

Research and Development
- PBE Research
- MBE Research
- Other Research

Pilot Projects - Demos
- Pilot-specific R&D (New and Leveraged)
- Pilot Demonstrations

Business Processes, Standards, Transition
- Phase I
- Phase II
- Phase III
S2020 FY11 Startup Strategy

- **RFI Objective:** Identify best Symposium participants
  - Criteria: Key areas, good ideas, track record

- **Symposium Objective:** ID best BAA sponsors, topics
  - Criteria: Key areas, paths to pilots, commitment

- **BAA Objectives:** ID best performer teams
  - Criteria: R&D capability, technology impact, paths to pilots
Next-Generation Support for Engineering Resilient Systems

An Aerospace Corp.-USC-AFOSR-Systems 2020 Win-Win Approach

In collaboration with AFIT response: An Interoperable Construct for SE

--Perform Joint Aerospace-USC research in model-based engineering (MBE), platform-based engineering (PBE), cyber assurance, and adaptive systems, in the context of the Aerospace CDC, to address future needs for:

• **Increased space systems resilience** via advanced cyber security and adaptive satellite self-defense research and technology
• **More rapid diverse-stakeholder collaboration** via empirical research in advanced collaboration technology and human collaboration effectiveness
• **More rapid and accurate multi-model analysis** via metadata-enabled model interoperability
• **More powerful models** via innovative use of multicore processors
• **Smart-system-based satellite and ground-system architectures**
• **Next-generation-systems affordability** via autonomous systems research and next-generation system cost and schedule estimation models

--Apply research results on pilot projects via extensions and integration of the Aerospace CDC and AFIT Integrated Modeling Environments

--Generalize the CDC capabilities for use in other domains

--Capture and analyze usage experience for continuing capability improvements
Proposed Next-Gen CDC Architecture

- Server
  - Database
  - Design Metamodels
  - Awareness Server

- Client
  - Design Tool
  - Local Data
  - Awareness Client
  - Awareness UI

Astrodynamics
Power
Thermal, Structures, Comm, Cost...
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